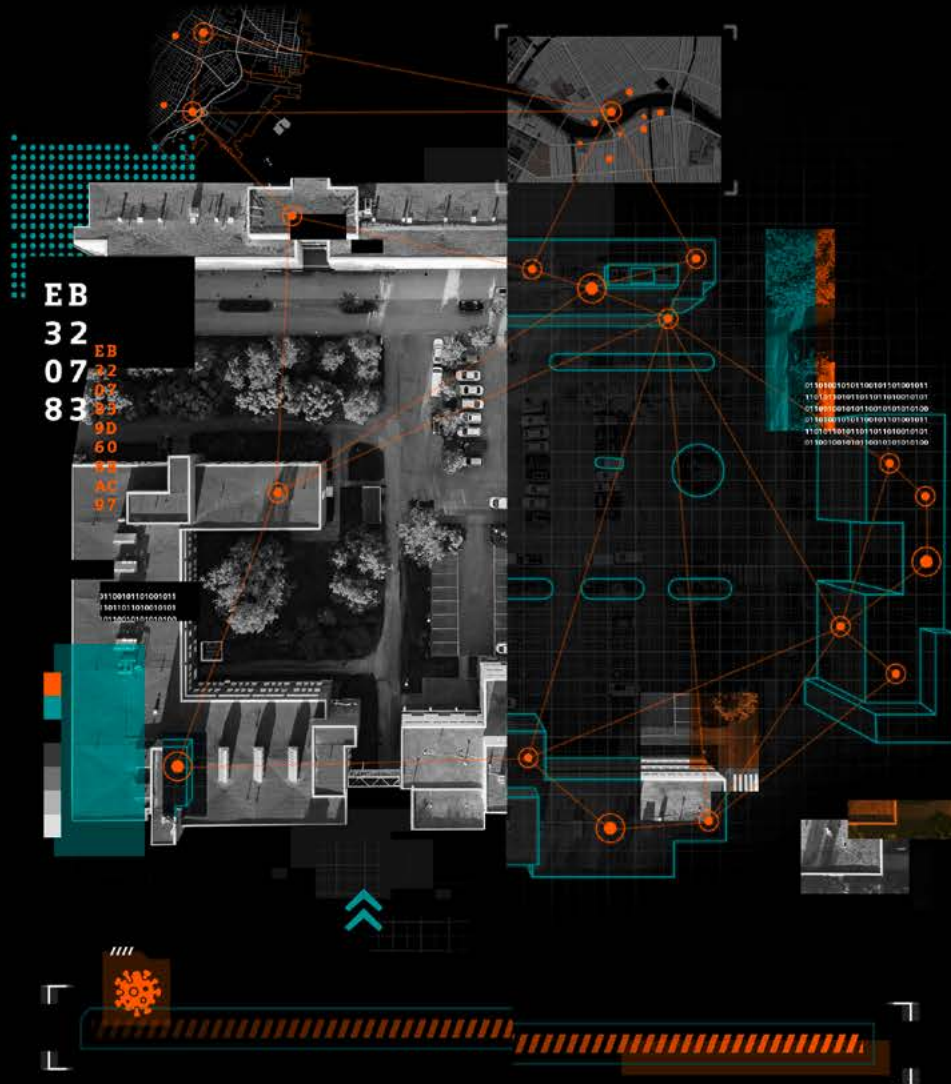


The New
Normal



**This changes everything:
The COVID-19 pandemic leads to a significant
acceleration of digitalization in healthcare**

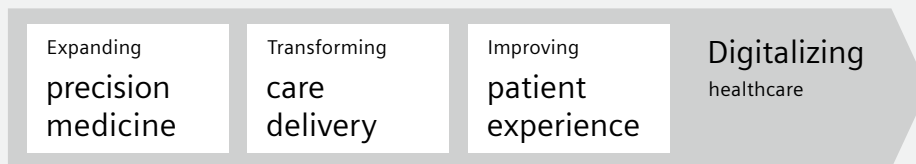
A thought leadership paper on "Digitalizing healthcare"

Preface

The Insights Series

The Siemens Healthineers **Insights Series** is our preeminent thought leadership platform, drawing on the knowledge and experience of some of the world's most respected healthcare leaders and innovators. The Series explores emerging issues and provides you with practical solutions to today's most pressing healthcare challenges.

We believe that increasing value in healthcare – delivering better outcomes at lower cost – rests on four strategies. These four principles serve as the cornerstones of the **Insights Series**.



The New Normal

The New Normal is a special edition of our **Insights Series** focusing on the COVID-19 pandemic. This series provides recommendations on how to confront the current SARS-CoV-2 outbreak and its implications, as well as strategies and ideas on how to emerge from the current crisis stronger, more resilient, and better prepared to address the healthcare challenges that lie ahead.

Please visit [siemens-healthineers.com/insights-series](https://www.siemens-healthineers.com/insights-series)

Executive summary

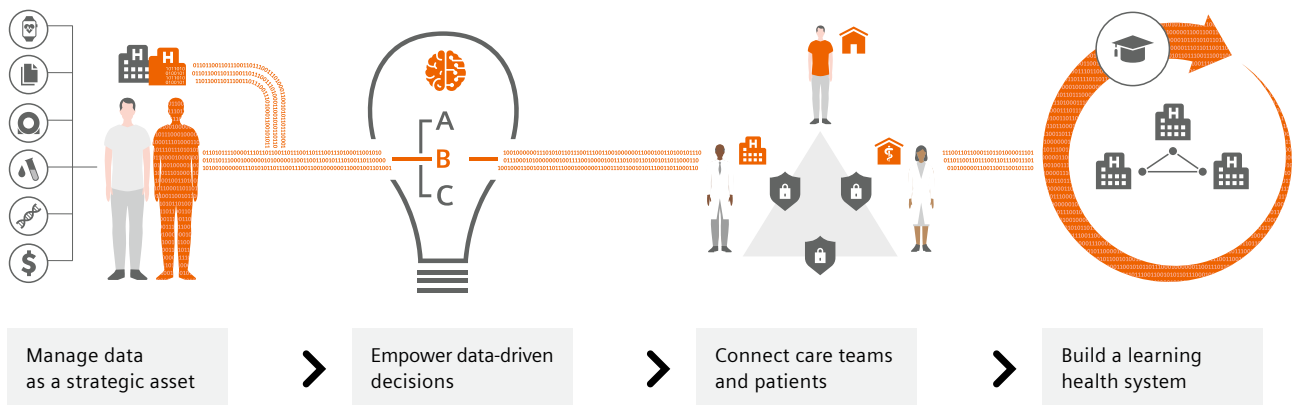
The COVID-19 pandemic has placed unprecedented stress on health systems around the world. It has also accelerated adoption of digital technologies. We will see higher investments than pre-pandemic levels in digital technologies used for customer-engagement, care coordination, enabling a remote workforce or telemedicine. Telemedicine, already undergoing rapid growth,¹ has quickly become a key tool for both preliminary COVID-19 screening and also for non-urgent care and consultations.

We expect that use of technology-based solutions will continue to grow after the immediate threat of COVID-19 has waned, as patients, providers, and payors alike discover the benefits of Virtual Forward triage and eICUs, remote care,

home monitoring, and digital communications. Healthcare systems must prepare for this tectonic shift now, even as they cope with the strains imposed by the COVID-19 pandemic.

An effective shift towards building a digital enterprise requires a commitment to manage data as a strategic asset. Health systems have to integrate data from multiple sources, like wearables, imaging, diagnostic laboratory, genetics, social determinants, and payors, on secure and easily accessible data platforms. Reliable and secure data together with advanced modeling and AI empowers data-driven decisions within a health system – be it in the clinical or operational space, or even directly helping consumers to make the right decision in their care.

How to build a digital enterprise



By managing data as a strategic asset, providers will gain unprecedented insight into clinical and non-clinical processes. They will be able to leverage powerful analytical tools, including AI technologies, to improve decision making. Virtual access,

telemedicine, and secure knowledge exchange will strengthen bonds between patients and care teams. A cultural shift to a digital mindset, coupled with new technology, will enable development of a continuously improving learning health system.

But data and digital technologies can be also used to better connect care teams and patients, bridging the physical separation between them and unifying fragmented systems of care. Along these lines, healthcare providers will embrace the concept of “moving information, not patients.”

Home monitoring and secure tele-consultation technology will enable some patients to receive hospital-quality care at home; this shift to home care will be enabled by digital decision support tools that can more accurately identify candidates for home-based outpatient care. Through remote care and telehealth, patients will gain more transparency into their own care, and become more active participants in their care, as well as in the prevention of disease.

Similarly, healthcare enterprises will learn how to extend the reach of their expert clinicians through services like teleradiology, which will give remote locations and standalone imaging clinics access to teaching hospital-quality care. Clinicians will be able to collaborate and share information productively in virtual spaces, reducing information loss during care transitions, and without the time, expense, and – in the age of COVID-19 – the risk of travel. Throughout these changes, data security and patient confidentiality must be preserved.

The digital transformation can be only successful and sustainable if healthcare leaders move beyond adopting technology solutions and begin to transform their institutions into learning health systems. This is a vital development for the future of healthcare, and one that will prepare providers to respond to new COVID-19 outbreaks or other infectious disease events. How? By including data and technology that is easy to use and frees up the time of caregivers, by establishing an organization committed to digital transformation, and by rigorously measuring and disseminating patient outcomes. Measuring outcomes is the basis for course correction and makes it possible to scale the right

measures toward continually optimizing, expanding and advancing enterprise performance. The learning health system will be better prepared for both “routine” care and for extraordinary circumstances like COVID-19.

Digital transformation of healthcare is inevitable; COVID-19 has merely sped up the timeline and underscored the need. This transformation isn’t easy; challenges to successful digital transformation include low quality of data, an inability to securely and conveniently access operational and clinical data, low interoperability of systems, and the fragmented care systems in place in many countries. The greatest challenge, though, may stem from a lack of understanding of the ongoing commitment that is necessary for successful digital transformation. COVID-19 has highlighted some of these challenges, but it has also spurred healthcare enterprises to meet these challenges head-on as part of a comprehensive response to the pandemic.

Enduring value-generating partnerships between healthcare providers and medtech companies can help provider organizations leverage technology to upgrade their organizations both in the near term, to better cope with the urgency of the pandemic, and in the long term, by investing in strategic digitalization efforts. In collaboration with medical technology partners, healthcare enterprises can create more value for stakeholders and deliver meaningful improvements in clinical and financial outcomes.

The challenge

COVID-19 has accelerated digitalization trends

Telemedicine has been in the spotlight due to the COVID-19 pandemic and the social distancing measures put in place by governments around the world. But a movement toward digitally-enabled remote care had been slowly taking shape and gathering momentum before the pandemic struck.

A review of U.S. claims data revealed that use of telehealth services increased by 624% from 2014 to 2018, albeit from a low baseline rate.¹ Remote monitoring was also on an upward trajectory, with Grandview Research projecting (pre-COVID-19) an annual growth rate of 13.5% through 2026.²

COVID-19 has indeed changed the face of medicine. Telehealth became the norm virtually overnight at many institutions; one institution reported an increase in the share of telehealth visits from <1% of total visits to 70% of total visits, reaching more than 1000 video visits per day in just 4 weeks.³

Digitally-enabled care delivers positive outcomes

Overall, there is substantial evidence that home-based telemedicine reduces care costs in a number of chronic conditions including congestive heart failure and diabetes.⁴ When done well, telemedicine can also deliver patient satisfaction that is at least equivalent to in-person care.⁵ There will always be a role for in-person care, but the benefits of telemedicine and remote monitoring point to sustained growth in their utilization in the coming years.

Remote monitoring has also emerged as a driver of positive health and financial outcomes. For example, remote monitoring of implanted cardioverter defibrillators is a cost-effective way to reduce morbidity and mortality.⁶ Other benefits of remote patient monitoring include delivery of health data to clinicians in real time, improved quality of life for patients, and reduced healthcare costs.⁷

The need for strategic digital transformation

When the safety concerns that are driving the current meteoric rise in telehealth utilization subside, patients' expectations for telehealth quality will rise, and they will flock to healthcare providers who deliver a high value patient experience. "As a provider, you have to get it right the first time. If a patient has a poor initial telemedicine experience with a provider, no matter how good the care they provide is, the patient is going to go somewhere else," said Asif Shah Mohammed, who leads the Washington, DC office of ECG Management Consultants.

The time has come to think about how to implement telehealth services ranging from outpatient care to sophisticated telesurgery services in an effective, patient-centric way.

But digital transformation of a healthcare enterprise goes well beyond the kinds of decentralized care that have risen to prominence during the COVID-19 pandemic. Indeed, telehealth and remote monitoring services can be seen as the merely the tip of the iceberg that is digital transformation.

Digitalizing healthcare requires profound changes in the way healthcare systems operate. This change begins with prioritizing collection and analysis of validated data on both the individual and population level. Provider organizations will need to make substantial investments in IT infrastructure and digital tools to remain competitive. Key among these investments is adoption of AI-powered clinical decision support tools, which can enable datadriven decision making among clinicians, administrators, and even patients.

True, sustainable digital transformation goes beyond adopting new tools and technologies. It requires a culture change and re-orientation around more data-driven care models. Simply digitalizing current processes and procedures won't be enough; healthcare providers, med tech companies, government agencies, payors and patient advocates will have to work together to sustainably deliver seamless digitally enabled care across a wide variety of care settings. Realigning organizations around data-driven, digitally enabled processes and care models is paramount to the long-term success of healthcare enterprises. The following pages include some key steps healthcare organizations can take to accelerate digital transformation for success in the era of COVID-19 and beyond.



What has changed:

- Widespread adoption of telemedicine and remote care experiences
 - Move toward decentralized care accelerated
 - Decentralization of testing and greater emphasis on point of care solutions
 - Remote workforce enablement, e.g., remote patient monitoring, remote operation of devices
 - Recognition of need to become a datadriven enterprise
-

The solution

Key steps toward digitalizing healthcare

1 Manage data as a strategic asset

Data is the foundation of a digital healthcare enterprise. Data has become a hospital's most valuable asset – and one of the most challenging to manage. Providers struggle with setting a strategic direction and collecting the right data from fragmented data sources with low interoperability. Analyzing poor-quality data may result in conclusions that are ineffectual or incorrect. Healthcare systems should follow four steps to fully leverage data: The first step is to set a data strategy including the identification of clinical and operational use cases and

defining data models managed by data governance departments. Both clinical data and operational data should be collected with specific goals in mind. Innovative institutions like Mount Sinai Health System in New York have taken up this challenge. Mount Sinai recently named its first Chief Data Officer, a move that will promote data access and sharing, and innovation throughout the organization. The creation of a comprehensive imaging research warehouse to give researchers access to imaging and EHR data on more than a million patients is representative of Mount Sinai's drive to leverage the power of clinical data.⁸

Reliable and secure data as basis for better decision making

Reasons data is not fully leveraged:



Limited strategic direction



Limited data access



Low-quality data



Fragmented sources/
low interoperability

Steps to create smart data management:



Set data strategy and establish governance



Capture data securely and automatically



Validate data via automated clean-up



Connect data via secure accessible platforms & EHRs



Reliable and secure data for better clinical and operational decisions

A key barrier to digitalization is the act of data entry itself. Capturing data securely and validating data automatically is the next step in managing data as a strategic asset. Some institutions are piloting use of voice assistants to simplify and automate data entry. Others, like Bumrungrad International Hospital in Bangkok, are working with partners to automate integration of multiple data sources in order to develop personalized treatment regimens.⁹

Collecting data is only half of the story. That data has to be connected to secure and easily accessible data platforms from fragmented sources – Community Health Systems, a leading operator of general acute care hospitals in the U.S, is increasing interoperability and patient data access by making user-friendly digital health records available via mobile devices at more than 100 affiliated hospitals in the U.S..¹⁰

Around the world, health systems are devising novel ways to integrate accurate data from fragmented sources and use it to create a holistic understanding of their patients and their enterprise in order to inform clinical and operational decisions. This drive to manage data as a strategic asset is no mere trend – it is a crucial step to ensure long-term viability of healthcare enterprises.



What has changed:

- Pressing need for institution-wide data strategy
 - Increased volume of data generates more requirements for validation and security
 - Drive for secure connections to data to inform clinical and operational decisions
-

Since launching an initiative that combined IT solutions with lean management principles, Health First has seen a 300% increase in adult transfers, and a 37% decrease in time from ED admission and hospital bed occupancy.

2 Empower data-driven decisions

Longitudinal patient and person data together with enterprise-wide, real-time operational data is the basis for better decision making in health systems. Collecting and connecting high quality validated data enables development of three types of decision support tools: clinical, operational and consumer.

Clinical decision support tools help health systems make sense of the deluge of clinical and operational data they are confronted with. According to BJ Moore, Chief Information Officer of Providence St. Joseph Health, "... we can... use AI and machine learning to identify precursors for diseases" by parsing the volumes of medical data now available from imaging, genomics, health records, remote monitors and wearables, and other sources.¹¹ AI is also useful in non-clinical contexts as well. Sheba Medical Center, near Tel Aviv, Israel, has developed AI-based tools with its technology partners to detect the presence and severity of coronavirus infection via sound and odor.¹²

AI-powered tools are currently being developed and used to benchmark insights, provide clinical decision support and to optimize workflows. It is even possible that AI could play a role in detecting infectious disease outbreaks and preventing them from developing into pandemics. Success in this role depends on global cooperation to collect and share validated, trustworthy data.¹³

Operational decision support spans asset and fleet management (e.g., enterprise-wide utilization, protocol, image management) to workforce and workflow management (e.g., workload balancing and aggregated scheduling systems) to hospital and enterprise performance systems enabling centralized oversight for integrated patient journey management. Health systems like Health First, in Brevard County, Florida, are reaping benefits from technology solutions that help them make datainformed decisions. Since launching an initiative that combined IT solutions with lean management principles, Health First has seen a 300% increase in adult transfers, and a 37% decrease in time from ED admission and hospital bed occupancy.¹⁴

Consumer decision support will become increasingly important in the future. Mobile-based tools like e-scheduling systems, which patients use to book their appointments and get access to diagnostics and treatment, will passively adapt and refine their behavior based on patients' preferences. The next level in consumer decision support will be active decision support, like health informatics apps and dashboards for personal health data. In the near future, predictive wellness coaches may provide continuous advice to help patients adopt customized healthy behaviors using life-long patient data to prevent sickness. Stakeholders will come to expect this kind of tailored support, so it is vital that healthcare enterprises begin creating the tools and systems necessary to support it.



What has changed:

- Data-driven decisions more important than ever in COVID-19 pandemic and future infectious disease events
- AI-enabled technology will help predict and control future outbreaks
- Development of more health informatics apps and dashboards for personal health data management

Digital simulations and AI support better decision making

Transform data ...

Longitudinal patient and person data



Enterprise-wide, real-time, operational data

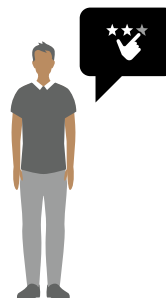


... into insight for better decision making



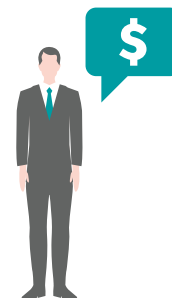
Clinical decision support

- Prediction of intervention
- Therapy decision support
- Chronic disease management



Consumer decision support

- E-scheduling systems
- Personal health informatics
- Predictive wellness coach*



Operational decision support

- Asset and fleet management
- Workflow and workforce mgmt.
- Enterprise performance systems

* This feature is based on research, and is not commercially available. Due to regulatory reasons its future availability cannot be guaranteed.

3 Connect care teams and patients

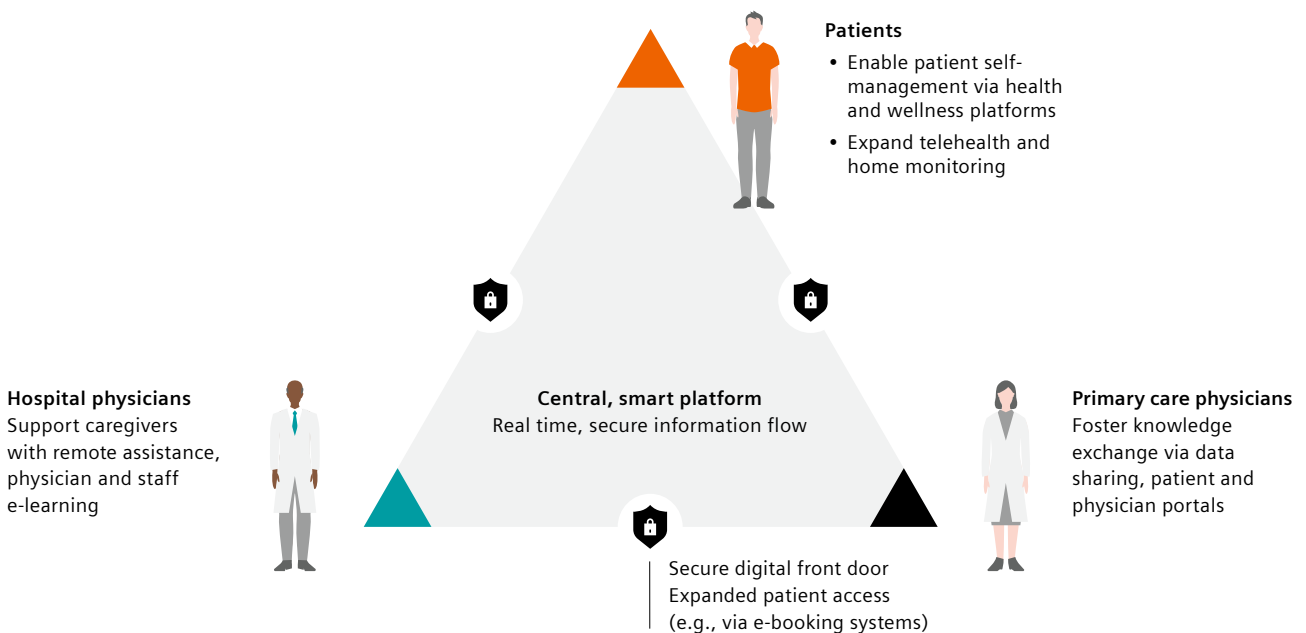
Health systems struggle with fragmented systems of care. Interoperability between hospital and primary care physicians' data is often lacking. As a result, information during care transactions can be lost, access to the right clinician at the right time is variable, and patient data is not fully leveraged when developing care plans.

The COVID-19 pandemic presents a challenge to forging connections between patients and their care teams. Digitalization can help connect caregivers and patients for better coordination and knowledge sharing while strengthening integrated care across the health system.

The most important stakeholders are patients, hospital physicians, primary care physicians and other referrers. Healthcare providers will increasingly engage patients outside traditional healthcare settings, e.g., via teleconsultations and remote monitoring.

Mercy Health, which serves four states in the American Midwest, is a pioneer in advanced telehealth, with an eICU program that achieves outcomes like reduced mortality (25% lower than APACHE predictions) and shorter hospital stays. The eICU is part of a comprehensive virtual care center that serves as the hub for 75 telemedicine services.¹⁵ Innovations like this will continue to pay dividends after the initial threat from COVID-19 has waned.

Towards effective integrated care and care continuity



Digitalization can help connect caregivers and patients for better coordination and knowledge sharing while strengthening integrated care across the health system.

Through digital technologies, it is possible for clinicians to provide care at a distance. Some specialties, including radiology and pathology, have already adopted technology to enable consultations from a distance. Telesurgery has become a viable way of providing access to highly specialized care from a distance. These applications of telehealth allow specific clinical expertise to be shared across a wider area, and help providers deliver vital services to remote or less developed areas where healthcare infrastructure is lacking.¹⁶

**Connecting patients and care teams:
Teleradiology**

Standardization of image formats and the near-ubiquity of broadband internet connections have made teleradiology an established practice in both industrialized nations and developing countries. With radiologists in short supply, teleradiology brings continuous radiology coverage to even smaller or remote locations, allowing more patients to benefit from specialist care.

In addition, teleradiology services allow staff to perform complex or highly specialized scans that may not otherwise be available in their institutions by leveraging expert knowledge digitally.

**Connecting patients and care teams:
Telesurgery**

Telesurgery relies on robotic technology and broadband internet connectivity to enable surgeons to perform procedures from a distance. While telesurgery systems have been on the market for the better part of two decades, the technology is maturing, with much improved latency and new innovations like haptic feedback giving surgeons a more “live” experience while operating robotic systems remotely.¹⁷

In these and many other specialties, tele-practice capabilities help deliver high quality care to more patients.

**New paradigm for data security
and patient privacy**

However, the promise of telemedicine and other forms of remote care and monitoring must be balanced with the need for patient privacy and security. Government agencies in the U.S. issued a number of HIPAA waivers in the wake of the COVID-19, which had the effect of easing the sudden transition to telemedicine. The waivers made it easier for patients and physicians to communicate via existing, generally non-HIPAA-compliant platforms.¹⁸

This allowed healthcare providers to deliver telehealth services via Apple FaceTime, Facebook Messenger, Google Hangouts and other consumer communications platforms. But these waivers do not free providers from their responsibilities to protect sensitive patient data. The rapid increase in use of telemedicine services highlights the importance of data security, and the sheer volume of data that must now be protected will provide a new challenge to healthcare systems. In the post-COVID-19 world, it will be vital for healthcare enterprises to develop and implement sound strategies for data security based on an increasing volume of telehealth and remote monitoring data. Partnerships with companies that understand the unique data security needs of health systems may help many institutions adapt more rapidly to this new normal.

Finally, digitalization can help forge stronger, more productive connections within care teams and groups of colleagues. Health systems can foster knowledge exchange among primary care physicians and other referrers via data sharing, patient and physician portals. Far from the early days of online message boards, these virtual workspaces provide secure, user-friendly environments for far-flung clinical teams and colleagues to share best practices, increase productivity, and tackle complex problems. Extending the reach of clinical experts will be of paramount importance for health systems in the near future.



What has changed:

- Social distancing strains connections between patients and caregivers
 - Acceleration of technology solutions will have positive impact on patient-caregiver relationship and patient experience
-

Measuring outcomes is the basis for course correction and makes it possible to scale positive changes toward continually optimizing, expanding and advancing enterprise performance.

4 Build a learning health system

Sustaining the digital transformation is a challenge for many health systems primarily because of a lack of commitment to both digital transformation and a culture of continuous improvement. These obstacles can be overcome through the creation of a learning health system (LHS).

A LHS leverages data and user-centric technology and frees clinicians from repetitive or time-consuming low-value tasks. Team-based care and care automation technologies, for example, enable distributed care delivery and automation of routine tasks, and deliver simple, intuitive user experiences.

Further, a learning health system requires leadership buy-in with joint targets, aligned incentives, and a commitment to transformation. Building the right organizational structures, including a dedicated team to support evaluation and learning activities throughout the organization, is another important lever for the shift to learning health systems.^{19,20} Institutions like Memorial Sloan Kettering Hospital, Kaiser Permanente, and Mayo Clinic have demonstrated their commitment to ongoing digital transformation by appointing their first Chief Digital Officers, a position that existed in only 6% of top global companies as recently as 2016.²¹ The goal of these high profile organizational changes is to leverage digital technology to deliver more convenient, personalized, and affordable care.

Rigorous measurement and secure sharing of patient outcomes is the crucial third step of the learning cycle. Multi-year patient data, PROMS data, social determinants, and patient preferences all must be measured and tracked over time.^{22,23,24} And most importantly, a learning health system should make outcomes transparent throughout the health system, using patient outcomes dashboards (for each clinician) that are regularly shared and reviewed inside the organization.

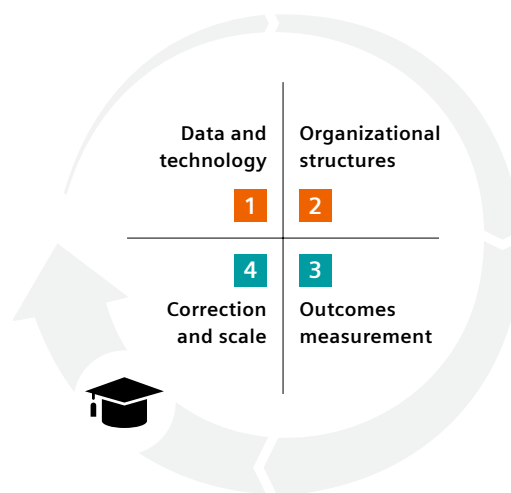
Measuring outcomes is the basis for course correction and makes it possible to scale positive changes toward continually optimizing, expanding and advancing enterprise performance. Patient and family engagement can give the right insights for setting up enterprise learning programs using improvement and evaluation trainings (e.g., lean, 6-sigma, qualitative, quantitative).²⁵

Geisinger Health System (GHS) in Northeastern Pennsylvania embodies the concept of a learning health system. GHS employs a system-engineering approach to continuously reduce variability and increase efficiency. Real world results include an algorithm that proactively identifies patients at high risk to miss an appointment. These patients receive a phone call prior to their appointment, resulting in a 24% decrease in no-shows.²⁴

Fostering a culture of improvement

What is a learning health system?

A healthcare system that performs interventions, measures outcomes and course corrects based on evaluation of outcomes.



How do you create a learning health system?

- 1 Leverage data and technology**
(e.g., decision support, care automation)
- 2 Build organizational structures**
(e.g., value realization office, leadership buy-in)
- 3 Measure patient outcomes**
(e.g., PROM*, transparency on outcomes)
- 4 Course correct and scale**
(e.g., enterprise-wide learning program)

Degree of learning

This approach of continuous learning and refinement will be vital to success in combating future outbreaks of COVID-19 or other infectious diseases. A culture that adapts quickly to new data, especially in the face of a novel pathogen, will be better prepared for both typical clinical challenges and future pandemics than one that pivots more slowly.



What has changed:

- Health systems must be ready to pivot pandemic response rapidly in response to new data and analysis
 - Culture of continuous improvement will remain after COVID-19 threat wanes
-

Conclusion

Digitalization is critical to success in managing COVID-19 and other infectious disease outbreaks. Many of the trends and technologies we have seen emerge during this pandemic – like telemedicine – have been developing for years, but have been thrust into the limelight since the emergence of the novel coronavirus.

Some processes and procedures were hastily adopted because of the pandemic, leaving substantial room for improvement. It is vital for healthcare institutions to consider long-term, strategic digital transformation now, in order to better serve patients in the future.

Because of the scope and complexity of digital transformation in healthcare, partnerships between healthcare provider organizations and industry are vital to success. Medtech partners with broad and integrated healthcare portfolios hold particular advantages for healthcare enterprises that are ready to embrace digital transformation.

Siemens Healthineers is committed to forming enduring, performance-based Value Partnerships with healthcare providers. These Value Partnerships can include everything from imaging and diagnostic fleet updates to healthcare IT to financing to process optimization consulting. Perhaps most importantly, Siemens Healthineers has the know-how and experience to guide healthcare enterprises through digital transformation with strategic consulting to set a course for success, and change management and operational consulting services to keep the institution and its staff on that course.

References

1. Viles E. Use of telehealth rapidly increased according to FAIR Health report. State of Reform, July 2019. Accessed June 12, 2020 at stateofreform.com/featured/2019/07/use-of-telehealth-rapidly-increased-according-to-fair-health-report/
2. Grand View Research. Remote patient monitoring system market worth \$1.8 Billion By 2026. March 2019. Accessed June 12, 2020 at grandviewresearch.com/press-release/global-remote-patient-monitoring-devices-market
3. Wosik J, Fudim M et al. Telehealth transformation: COVID-19 and the rise of virtual care. *Am Medical Informatics Association*. 2020;27:957-962. doi:10.1093/jamia/ocaa067.
4. Michaud TL, Zhou J, et al. Costs of home-based telemedicine programs: a systematic review. *Int J Technol Assess Health Care*. 2018;34(4):410–418. pubmed.ncbi.nlm.nih.gov/30058505/.
5. Sirintrapun SJ, Lopez AM. Telemedicine in cancer care. *Am Soc Clin Oncol Educ Book*. 2018;38:540–545. doi:10.1200/EDBK_200141.
6. Hummel JP, Leipold RJ, Amorosi SL, et al. Outcomes and costs of remote patient monitoring among patients with implanted cardiac defibrillators: An economic model based on the PREDICT RM database. *J Cardiovasc Electrophysiol*. 2019;30(7):1066–1077. doi:10.1111/jce.13934.
7. Bogdanova H. Pros and cons of remote patient monitoring. *Health IT Outcomes*. Accessed June 12, 2020 at healthitoutcomes.com/doc/pros-and-cons-of-remote-patient-monitoring-0001.
8. Kent J. Mount Sinai advances innovation with new chief data officer role. *Health IT Analytics*. Accessed June 12, 2020 at healthitanalytics.com/news/mount-sinaiadvances-innovation-with-new-chief-data-officer-role
9. Koh D. Bumrungrad International partners with BC Platforms to offer personalised healthcare solutions for patients. *Healthcare IT News*. Accessed June 12, 2020 at healthcareitnews.com/news/bumrungrad-international-partners-bc-platformsoffer-personalised-healthcare-solutions-patients.
10. Eddy N. Community Health Systems makes Apple Health Records available at 100 affiliated hospitals. *Healthcare IT News*. Accessed June 12, 2020 at healthcareitnews.com/news/community-health-systems-makes-apple-health-records-available-100-affiliated-hospitals.
11. Gooch, K. Cleveland Clinic, Brigham, Stanford & others name healthcare's most promising tech. *Becker's Hospital Review*. Accessed June 12, 2020 at assets.asccommunications.com/whitepapers/leidos-must-reads-ebook-jan-2020.pdf.
12. Sheba Medical Center. Saving lives from COVID-19 is the latest mission of Israeli army's R&D lab. *Sheba Online*. Accessed June 12, 2020 at shebaonline.org/saving-lives-fromcovid-19/.
13. Agrebi S, Larbi A. Use of artificial intelligence in infectious diseases. *Artificial Intelligence in Precision Health*. 2020;415–438. doi:10.1016/B978-0-12-817133-2.00018-5.
14. Blanchard JC, Rudin RS. Improving hospital efficiency through data-driven management: a case study of Health First, Florida. *Rand Health Q*. 2016;5(4):2. Published 2016 May 9.
15. Landi H. Mercy Health opens virtual care center dedicated to telehealth. Accessed June 12, 2020 at hcinnovationgroup.com/clinical-it/news/13025782/mercy-healthopens-virtual-care-center-dedicated-to-telehealth.
16. Sankaye S, Kachewar S. Telepathology for effective healthcare in developing nations. *Australas Med J*. 2011;4(11):592–595. doi:10.4066/AMJ.2011.855.
17. Choi PJ, Oskouian RJ, Tubbs RS. Telesurgery: Past, Present, and Future. *Cureus*. 2018;10(5):e2716. Published 2018 May 31. doi:10.7759/cureus.2716.
18. Health IT Security. Insights into HHS COVID-19 HIPAA waivers and lasting implications. Accessed June 12, 2020 at healthitsecurity.com/features/insights-into-hhs-covid-19-hipaa-waivers-and-lasting-implications.
19. AHRQ. Baylor Scott & White Health: building a foundation for continuous improvement. Accessed June 12, 2020 at ahrq.gov/sites/default/files/wysiwyg/lhs/lhs_case_studies_bsw.pdf.
20. AHRQ. University of Utah Health: creating a formula for value based care. Accessed June 12, 2020 at ahrq.gov/sites/default/files/wysiwyg/lhs/lhs_case_studies_utah_health.pdf.
21. Landi H. Will the Chief Digital Officer Role be Key to Healthcare's Future? Accessed June 29 at hcinnovationgroup.com/policy-value-based-care/article/13030590/will-thechief-digital-officer-role-be-key-to-healthcares-future
22. Beyer B. Martini-Klinik: patient-centred outcomes data collection to improve prostate cancer care. Accessed June 12, 2020 at all-can.org/efficiency-hub/martini-klinik-patient-centredoutcomes-data-collection-to-improve-prostate-cancer-care/.
23. AHRQ. HCA: How a large healthcare system is looking beyond the electronic health record. Accessed June 12, 2020 at ahrq.gov/sites/default/files/wysiwyg/lhs/lhs_case_studies_hca.pdf.
24. Foley T, Fairmichael F. Site visit to Geisinger Health System. The Learning Healthcare Project. Accessed June 12, 2020 at learninghealthcareproject.org/section/evidence/40/63/site-visit-to-geisinger-health-system.
25. AHRQ. Denver Health: how a safety net system maximizes its value. Accessed June 12, 2020 at ahrq.gov/sites/default/files/wysiwyg/lhs/lhs_case_studies_denver_health.pdf.



Suggested follow-up on

Siemens-healthineers.com/news
Digitalizing healthcare

- Siemens Healthineers Paper Embracing Healthcare 4.0. Available at: [siemens-healthineers.com/insights/news/embracing-healthcare-4-0.html](https://www.siemens-healthineers.com/insights/news/embracing-healthcare-4-0.html)
- Jochen A. Werner on Digitalizing Healthcare and Smart Hospitals. Available at: [siemens-healthineers.com/insights/news/shs-talks.html](https://www.siemens-healthineers.com/insights/news/shs-talks.html)



Information:

The Siemens Healthineers Insights Series is our preeminent thought leadership platform, drawing on the knowledge and experience of some of the world's most respected healthcare leaders and innovators. It explores emerging issues and provides practical solutions to today's most pressing healthcare challenges.

All issues of the Insights Series can be found here: [siemens-healthineers.com/insights-series](https://www.siemens-healthineers.com/insights-series)



Contact:

If you have further questions our would like to reach out to us, please do not hesitate to contact our expert directly:

Ralph Wiegner, PhD
Global Head of Digitalizing healthcare

ralph.wiegner@siemens-healthineers.com

At Siemens Healthineers, our purpose is to enable healthcare providers to increase value by empowering them on their journey towards expanding precision medicine, transforming care delivery, and improving patient experience, all enabled by digitalizing healthcare. An estimated five million patients worldwide every day benefit from our innovative technologies and services in the areas of diagnostic and therapeutic imaging, laboratory diagnostics and molecular medicine as well as digital health and enterprise services.

We are a leading medical technology company with over 120 years of experience and 18,500 patents globally. With about 50,000 dedicated colleagues in over 70 countries, we will continue to innovate and shape the future of healthcare.

Siemens Healthineers Headquarters

Siemens Healthcare GmbH
Henkestr. 127
91052 Erlangen, Germany
Phone: +49 9131 84-0
[siemens-healthineers.com](https://www.siemens-healthineers.com)